YEMEL'YANCHIKOV, A.N., kand.tekhn.nauk; PATRANINA, O.P., inzh.

Increasing the output of ski blanks in the Vologda Furniture Factory. Der.prom. 11 no.4:17-19 Ap '62. (MIRA 15:4)

1. Arkhangel'skiy lesotekhnicheskiy institut im. V.V.Kuybysheva.
(Vologda--Skis and skiing)

KEMEL'YANENKO, G. A.

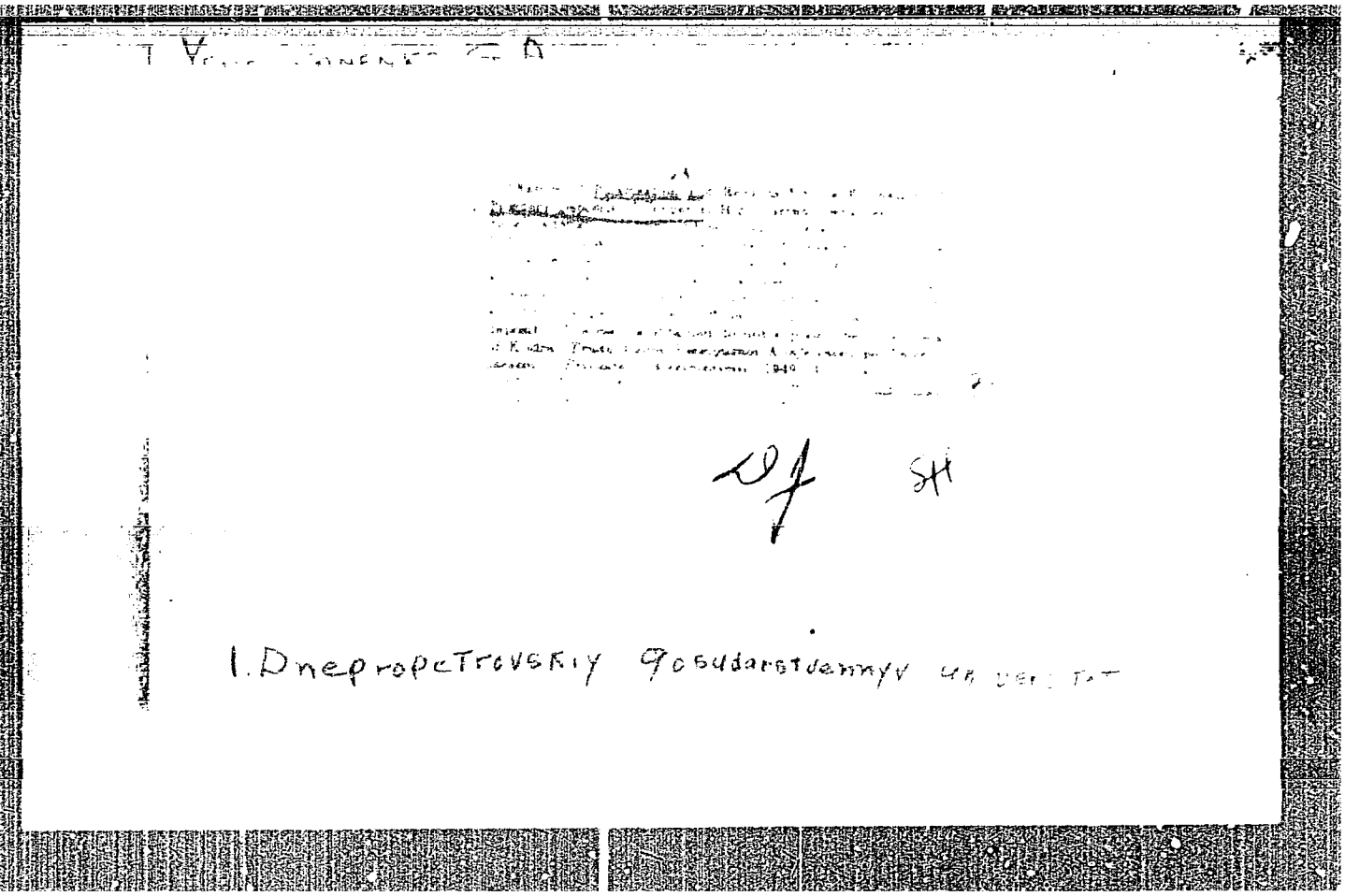
USSR.

Nature of second potentials in cathodic separation of metals. G. A. Kmel'yanenko. *Nauch. Zapiski Dnepropetrov. Unta.* 43, 111–7 (1954). *Referat. Zhur., Khim.* 1954, No. 25043.—Cathodic sepn. of Cu and Cd on a Hg drop electrode from aq. solns. of their salts with various anions was studied for the purpose of elucidating the nature of second potentials (Kudra, *Trudy 2-oi Vsesoyuz. Konferents. Teoret. i Prikład. Elektrokhim., Akad. Nauk Ukr. S.S.R.* 1949, 47–62). The anions were: SO_4^{--}, NO_3^-, Cl^-, I^-, $CH_3CO_2^-$, PO_4^{---}, $C_6H_4(OH)SO_3^-$, $C_6H_5O_6^{--}$, $C_6H_5O_7^{---}$, and $C_4H_4O_6^{--}$. The corresponding acid and salts were added as auxiliary electrolytes. The potential of the 2nd waves (second potential) in all cases was attributable not to the discharge of complex metal ions but either to the evolution of H (−1.5 v. in acid medium, −2 v. in neutral) or, in the case of nitrates, reduction of NO_3^-. In nonaq. solns., alc., or formamide, the second potentials of Cu, Cd, Ag, and Ni were also to be attributed to an electrode process characteristic of the auxiliary electrolyte or solvent. Thus the results contradicted the Kudra (*ex*) hypothesis attributing second potentials to the reduction of complex ions of the metal.

M. Hoseh

CH

MET



Effect of temperature on the rate of electrodeposition of copper from sulphuric acid solutions. G. A. Yemel'yanenko. (*Doklad. Akad. Nauk SSSR*, 1955, 105, 1003—1006). The anomalous effects of temp. on the electrolysis of weakly acid $CuSO_4$ solutions, e.g., the increase of polarization at temp. above 30°, are explained in terms of chemical changes occurring on the surface of the Cu cathode—formation of oxide, hydroxide, or basic Cu salts. This is supported by experiments which showed that no reduction in the rate of Cu deposition occurred in a strongly acid solution, also that, when the electrodes were immersed in aq. $CuSO_4$ at 40 or 60° and then tested for polarization at 15 or 30°, they gave polarization curves as if the measurements were being made at 40 or 60°. Current/polarization curves are given for 0·1N-$CuSO_4$ at temp. from 15 to 63° and the corresponding log i–$1/T$ curves are plotted.

F. W. KIRKBRIDE.

Yemel'yanenko, G.A

B-12

USSR/Electrochemistry

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26306

Author : G.A. Yemel'yanenko, V.P. Galushko
Title : Nonsteady Processes at Electrolysis of Copper and Nickel Solutions.

Orig Pub : Zh. fiz. khimii, 1956, 30, No 8, 1710-1717

Abstract : The importance of studying the time dependences of the electrode potential (φ) and the current density (i) was discussed in reference to the kinetics of electron processes, and the changes of φ and i in time (τ) was studied at a constant voltage on the electrolizer at the electro-deposition of Cu and Ni. Cu was deposited from a solution of 0.1 n. of $CuSO_4$ + 0.5 n. of H_2SO_4 at 20 to 22°. It was shown in the case of electrodeposition of Cu, that i has a great magnitude at the beginning of the electrolysis (two seconds after switching in) and that it decreases with time, to which the rise of the negative φ in time corresponds and which is explained by the considerably great magnitude of the concentration polarization. If some gelatin was added to the Cu electrolyte (0.01 g per lit), the magnitude of the initial current at a low electrolizer

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Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26306

voltage (up to 0.16 - 0.17v) decreases in comparison with the solution without the addition, and, besides, the current strongly decreases with time, which indicates a strong retardation of the process; a slow rise of the negative φ corresponds to it. A considerably high increase of the current takes place at greater voltages, which in the opinion of the authors is caused by the potential of gelatin desorption having been reached. It is shown on an example with Cu that it is possible to estimate the applicability of either method of surface preparation by the method of curves (i, t) and (φ, t). Ni was deposited from a solution of 0.5 n. of $NiSO_4$ + $(NH_4)_2SO_4$ (12 g per Lit) + NaCl (5 g per lit) (pH = 4.8) at 20 to 22°. The curves (i, t) in case of Ni are characterized by a little initial decrease of i with a following sharp rise of the current, to which not a decrease, but an increase of the negative φ of the electrode corresponds. The curves (i, t) are of the same character in the same solution without $NiSO_4$. The anode φ rises sharply at the beginning and, after that, drops. The opinion is expressed that φ is redistributed between the cathode and the anode, in consequence of which φ and

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26306

i rise on the cathode. In solutions free of NaCl, or if the Ni anodes were replaced with graphite ones, the abnormal course of the cathode curves (i, t) and (φ, t) is eliminated. The authors explain the initial retardation at the electrodeposition of Ni by the retardation of the activation of Ni-anodes by Cl^- ions. The cathode process accelerates together with the activation of the Ni-anodes in consequence of the greater φ falling on the cathode.

YEMEL'YANENKO, G.A.

The choice of a system of signs for the e. m. f. and for the electrode potential. Zhur. fiz. khim. 30 no.12:2829-2830 D '56. (MLRA 10:4)

1. Dnepropetrovskiy gosudarstvennyy universitet.
(Electromotive force) (Electrodes)

YEMEL'YANENKO, G.A.; GALUSHKO, V.P.

Effect of sulfuric acid solutions on metallic copper at various temperatures. Zhur. neorg. khim. 2 no.12:2834-2837 D '57.
(Copper sulfate) (Copper oxides) (MIRA 11:2)

YEMEL'YANENKO, G-A.

AUTHOR: Emel'yanenko G.A. 73-2-17/22

TITLE: Causes of the anomalous course of the dependence of electric precipitation of copper on the temperature. (Prichiny anomal'nogo khoda zavisimosti skorosti elektroosazhdeniya medi ot temperatury).

PERIODICAL: "Ukrainskiy Khimicheskiy Zhurnal" (Ukrainian Journal of Chemistry), Vol.23, No.2, March-April, 1957, pp.243-250 (USSR).

ABSTRACT: The investigation of the influence of the temperature on the velocity of the electrochemical process procures additional data on the mechanism of the process. Systematic investigations were recently carried out by S.V.Gorbachev et al (ref.2-5). They concluded that the thermal method could be used for determining the character of polarisation. The basic criteria were the course of the dependence of the log of the current density (lg i) on the inverse magnitude of the absolute temperature $(\frac{1}{T})$ at constant polarisation of the electrode, the value of the so-called effective energy of activation of the process (w) and its dependence on the polarisation of the electrode $(\Delta\varphi)$. S.V.Gorbachev stated that both the

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Causes of the anomalous course of the dependence of electric precipitation of copper on the temperature. (Cont.)

concentrational and the chemical polarisation are characterised by a linear course of dependence lg i on $\frac{1}{T}$. But for the concentrational polarisation w has a value of the order of a few calories and is practically independent from the electrode polarisation value. The chemical polarisation is in a defined relation to the electrode polarisation and w reaches 2 figure values of calories (kh. cal.) To clarify the part of chemical transformations during increased temperatures the author investigated the influence of the temperature on the velocity of electric precipitation of copper from sulphuric acid solutions. The anomalous course of the dependence of the velocity of electro-precipitation of copper on the temperature was found to be caused by chemical transformations occurring on the "metal-liquid" boundary line at increased temperatures. The formation of oxides, their hydrates or basic metal salts can be related to such chemical transformations. The maxima of the curves of the dependence of the log of the current density on the inverse value of the

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Causes of the anomalous course of the dependence of electric precipitation of copper on the temperature. (Cont.)

absolute temperature are explained. (Diagrams 3, 5, 8, 9 and 10). The polarisation curves for various temperatures and different concentrations of $CuSO_4$ are shown in Diagrams 2, 4, 6 and 7.

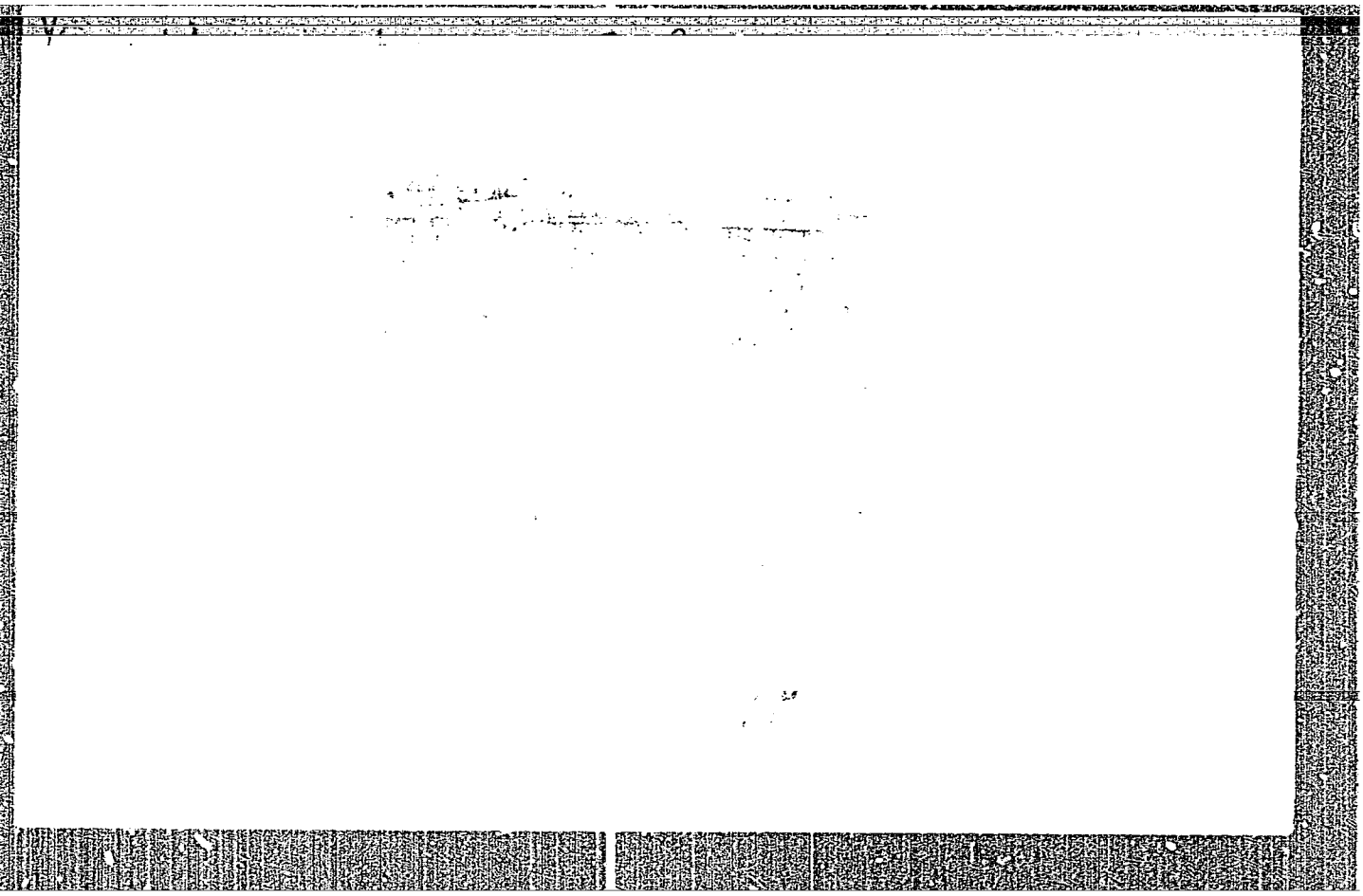
There are 9 diagrams, 1 table and 1 drawing. There are 7 Slavic references.

ASSOCIATION: Dnepropetrovsk State University (Dnepropetrovskiy Gosudarstvennyy Universitet).

SUBMITTED: October 24, 1955. (first), September 10, 1956 (final)

AVAILABLE: Library of Congress

Card 3/3



APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962620011-3"

AUTHOR: Yemel'yanenko, G. A. SOV/76-32-9-26/46

TITLE: On the Anomalous Temperature Dependence of the Electrodeposition Rate of Copper (Ob anomal'noy zavisimosti skorosti elektrosazhdeniya medi ot temperatury)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 9, pp 2119-2122 (USSR)

ABSTRACT: The author investigated 0,1 n $CuSO_4$ solution. In the first series of experiments the dissolved oxygen from the air was driven out with hydrogen, while in the second series it was allowed to remain in solution. A platinum electrode was used, and a compact copper layer was allowed to separate out onto it under a high current density. The current density (i) and the potential of the electrodes were measured at different temperatures. The results are represented in two graphs as a function of lg i and $\frac{1}{T}$ (reciprocal of the absolute temperature) at different potentials.
The results so obtained suffice to show that the anomalies arise through chemical changes on the copper-solution boundary under increases in temperature. There the following redox re-

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On the Anomalous Temperature Dependence of the Electrodeposition Rate of Copper

action takes place to a small extent: $Cu + Cu^{2+} \rightleftarrows 2\ Cu^{+}$. Cu^{+} hydrolyses and forms a yellow coating of cuprous (I) oxide, which is transformed into a red coating. The composition of this coating was analyzed quantitatively and qualitatively and was found to be practically pure Cu_2O. There are 2 figures and 12 references, 12 of which are Soviet.

ASSOCIATION: Dnepropetrovskiy gosudarstvennyy universitet (Dnepropetrovsk State University)

SUBMITTED: April 12, 1957

5(4)

AUTHOR: Yemel'yanenko, G. A.

SOV/76-32-11-2/32

TITLE: The Role of Cuprous Oxide in the Development of an "Anomalous" Dependence of the Velocity of Electrodeposition of Copper on Temperature (Rol'zakisi medi v vozniknovenii "anomal'noy" zavisimosti skorosti elektroosazhdeniya medi ot temperatury)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 11, pp 2479 - 2482 (USSR)

ABSTRACT: The formation of Cu_2O on a copper electrode at increased temperature was already pointed out (Refs 1,2). Together with V.G.Govorukh the author carried out measurements of the average formation velocity of the Cu_2O deposition on the Cu electrode in a copper sulfate solution at different temperatures. The Cu_2O coating was separated from the electrode by means of a hot 15% NH_4Cl solution and determined gravimetrically. The author used $CuSO_4$ and $CuSO_4 \cdot 5H_2O$ solutions. At 40°C the velocity of the Cu_2O deposition

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is low, it increases, however, rapidly with temperature. According to the degree of accumulation of the reaction products the formation velocity of Cu_2O decreases. This is explained by a partial oxidation of Cu_2O by the oxygen dissolved in the electrolyte. The crystalline Cu_2O layer firmly fixed to the surface leads to the passivation of the corresponding part of the surface. To investigate the velocity of activation -passivation of the electrode surface the electrode polarization $\Delta\varphi$ was measured at different current densities with respect to time. The electrolysis took place in sulfuric acid solutions at different temperatures. It was found that the minimum of the value $\Delta\varphi$ is, with the increase of the current density, displaced to higher temperature values, which is explained by a reduction of the copper ion content of the layer near the cathode. The formation of an "anomalous" course of the dependence of the rate of electrodeposition of

copper on temperature is not explained by a phase polarization but by a complete passivation of the surface parts of the electrode by Cu_2O. The increase in temperature promotes two opposite effects. On the one hand, the addition of the Cu_2O ions to the electrode surface is intensified, and on the other, the passivation of the electrode surface by the Cu_2O formation is accelerated. In the first case the velocity of electrolysis increases with temperature, in the second it decreases. The increase of H^+ ion concentration in the solution to prevent the Cu_2O formation and thus to remove the "anomalous" influence of temperature upon the electrodeposition of copper was already pointed out (Ref 1). There are 2 tables and 4 Soviet references.

The Role of Cuprous Oxide in the Development of an "Anomalous" Dependence of the Velocity of Electrodeposition of Copper on Temperature

SOV/76-32-11-2/32

ASSOCIATION: Dnepropetrovskiy gosudarstvennyy universitet im.300-letiya vossoyedineniya Ukrainy s Rossiyey (Dnepropetrovsk State University imeni 300th Anniversary of the Unification of the Ukraine With Russia)

SUBMITTED: March 30, 1957

Card 4/4

YEMEL'YANENKO, G.A.; SEMERYUK, V.I.; Prinimala uchastiye ZHIGULINA, N.S., studentka

Zinc plating from an ammonia electrolyte. Ukr.khim.zhur. 27 no.6:828-830 '61. (MIRA 14:11)

1. Dnepropetrovskiy gosudarstvennyy universitet.
(Zinc—Plating)
(Ammonia)

YEMEL'YANENKO, G.A.

Effect of temperature on the rate of the electrodeposition of zinc from sulfate solutions. Zhur. fiz. khim. 35 no.2:393-400 F '61. (MIRA 16:7)

1. Dnepropetrovskiy gosudarstvennyy universitet.
(Zinc plating)

S/122/62/000/007/004/006
D262/D308

AUTHORS: Semeryuk, V.I., Engineer; Yemel'yanenko, G.A., Candidate of Chemical Sciences

TITLE: Acid electrolyte for cadmium plating of complex details

PERIODICAL: Vestnik mashinostroyeniya, no. 7, 1962, 42 - 43

TEXT: The article describes the experiments conducted with the electrolyte (50 g/litre $CdSO_4 \cdot 8/3\ H_2O$ and 50 g/litre H_2SO_4) containing additions of sulfurated naphtalene (3:1 mixture of concentrated sulfuric acid and naphtalene), gelatin and hide glue. The results show that these additions improve the diffusing power of the electrolyte and have considerable positive influence on polarization and the size of cadmium crystals. This electrolyte is recommended as a replacement for the cyanide electrolyte. There are 1 figure and 1 table.

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YEMEL'YANENKO, G.A.; BAYBAROVA, Ye.Ya.

Electrodeposition of zinc and lead at given high current densities.
Ukr.khim.zhur. 28 no.7:809-911 '62. (MIRA 15:12)

1. Dnepropetrovskiy gosudarstvennyy universitet.
(Zinc plating) (Lead plating)

YEMEL'YANENKO, G.A.; GOT'MANOVA, T.T.

Effect of temperature on the electrodeposition of cadmium from sulfate solutions. Zhur. fiz. khim. 36 no.3:508-512 Mr '62. (MIPA 17:8)

1. Dnepropetrovskiy gosudarstvennyy universitet.

S/076/62/036/007/008/010
B101/B138

AUTHORS: Yemel'yanenko, G. A., and Alekseyeva, Ye. P.

TITLE: Effect of temperature on the electrodeposition of some metals

PERIODICAL: Zhurnal fizicheskoy khimii, v. 36, no. 7, 1962, 1532 - 1536

TEXT: To find the optimum temperatures for the electrodeposition of Cu, Zn, and Ag from various electrolytes, the curves log i versus 1/T were plotted. The following electrolytes were used: 12.5 g/l $CuSO_4 \cdot 5H_2O$ + 2.5 g/l H_2SO_4 (I); 200 g/l $CuSO_4 \cdot 5H_2O$ + 50 g/l H_2SO_4 (II); 450 g/l $ZnSO_4 \cdot 7H_2O$ + 30 g/l $Al_2(SO_4)_3 \cdot 18H_2O$ (III); 17 g/l $AgNO_3$ (IV), and 40 g/l AgCl + 200 g/l $K_4[Fe(CN)_6] \cdot 3H_2O$ + 20 g/l K_2CO_3 (V). A deviation from linearity was observed for the function log i = f(1/T). It occurred at certain polarizations and temperatures and was more distinct at high polarization. It lies at 40 mv, 40-50°C, for electrolyte I; at 50 mv, 50-60°C, or 100 mv, 40°C, for II; at 50 mv, 30-40°C, for III; at 10 mv,

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40°C, or 20 mv, 35°C, for IV; and at 30 mv, 35°C or 100 mv, 45°C, for V. The activation energy W for electrolytes I-IV is much lower above than below the bend in the curve, whereas V shows the opposite behavior to W. The deviation from linearity and the drop in W for I-IV are attributed to transition from chemical to concentration polarization. The deviation of V is attributed to the fact that Ag^+ ions are discharged at low polarization, but complex silver ions at high polarization. Conclusion: This transition from chemical to concentration polarization must be allowed for when deciding the optimum temperature. Optimum temperatures for a rapid and irreversible process with prevailing chemical polarization are: for I (no data); II 60 mv, up to 40°C; III 50 mv, 18-25°C; IV (no data); V 250 mv, 60-80°C. There are 5 figures and 2 tables.

ASSOCIATION: Dnepropetrovskiy gosudarstvennyy universitet (Dnepropetrovsk State University)

SUBMITTED: May 29, 1961

YEMEL'YANENKO, G.A.; SIMULIN, G.G.; BAYBAROVA, Ye.Ya.

Electrodeposition of copper from sulfuric acid solutions at high current densities. Ukr. khim. zhur. 29 no.4:404-408 '63. (MIRA 16:6)

1. Dnepropetrovskiy gosudarstvennyy universitet.
(Copper plating)

YEMEL'YANENKO, G.A.; BAYBAROVA, Ye.Ya.; SIMULIN, G.G.

Cathodic deposition of zinc and lead at high current densities. Ukr. khim.zhur. 29 no.5:515-518 '63. (MIRA 16:9)

1. Dnepropetrovskiy gosudarstvennyy universitet.

YEMEL'YANENKO, G.A.; SIMULIN, G.G.

Electrodeposition of copper from ammonia liquors at high current densities. Ukr. khim. zhur. 29 no.7:727-730 '63. (MIRA 16:8)

1. Dnepropetrovskiy gosudarstvennyy universitet.
(Copper plating)

S/076/63/037/003/015/020
B101/B215

AUTHORS: Yemel'yanenko, G. A., Afanasenko, V. I.

TITLE: Effect of temperature on the electrodeposition of chromium

PERIODICAL: Zhurnal fizicheskoy khimii, v. 37, no. 3, 1963, 680-682

TEXT: The effect of temperature on the electrolysis of a solution of 180 g/l CrO_2 + 1.8 g/l H_2SO_4 was studied between 10 and 60°C at constant polarization of the cathode. The curves log i versus $10^3/T$ show that the rate of deposition at 20 - 30°C passes a maximum. This is explained by thermal and electrical activation of the reducing substance acting against electrodeposition, and by inhibited deposition by reaction between depcsited Cr and the cathodic layer whose thickness and properties are changed by temperature. There are 1 figure and 2 tables.

ASSOCIATION: Dnepropetrovskiy universitet (Dnepropetrovsk University)

SUBMITTED: May 25, 1962

Card 1/1

YEMEL'YANENKO, G.A.; AFANASENKO, V.I.

Kinetics of the electrolysis of a chromium electrolyte at various temperatures. Zhur. fiz. khim. 37 no.4:915-918 Ap '63. (MIRA 17:7)

1. Dnepropetrovskiy gosudarstvennyy universitet.

YEMEL'YANENKO, G.A.; AFANASENKO, V.I.

Anomalous effect of temperature on the rate of electrodeposition of chromium. Zhur.fiz.khim., 37 no.8:1854-1857 Ag '63. (MIRA 16:9)

1. Dnepropetrovskiy gosudarstvennyy universitet.
(Chromium plating)

YEMEL'YANENKO, G.A.; SIMULIN, G.G.

Oscillographic determination of the transport numbers of ions in electrolyte solutions. Zhur. fiz. khim. 38 no.12.3004-3005 D '64. (MIRA 18:2)

1. Dnepropetrovskiy gosudarstvennyy universitet.

YEMEL'YANENKO, G.A.; SIMULIN, G.G.

Causes for the formation of some loose metal deposits on the cathode at high current densities. Dokl. AN SSSR 158 no.5:1186-1189 O '64. (MIRA 17:10)

1. Dnepropetrovskiy gosudarstvennyy universitet. Predstavleno akademikom A.N.Frumkinym.

YEMEL'YANENKO, G.A.; SIMULIN, G.G.

Oscillographic study of nickel electrodeposition at high current densities. Elektrokhimiia 1 no.11:1384-1388 N '65. (MIRA 18:11)

1. Dnepropetrovskiy gosudarstvennyy universitet.

YEMEL'YANENKO, G.A.; BAYBAROVA, Ye.Ya.

Electrodeposition of silver at high current densities. Ukr. khim. zhur. 31 no.1:37-41 '65. (MIRA 18:5)

1. Dnepropetrovskiy gosudarstvennyy universitet.

NEMCL'YANENKO, G.A.; SIMULIN, G.G.

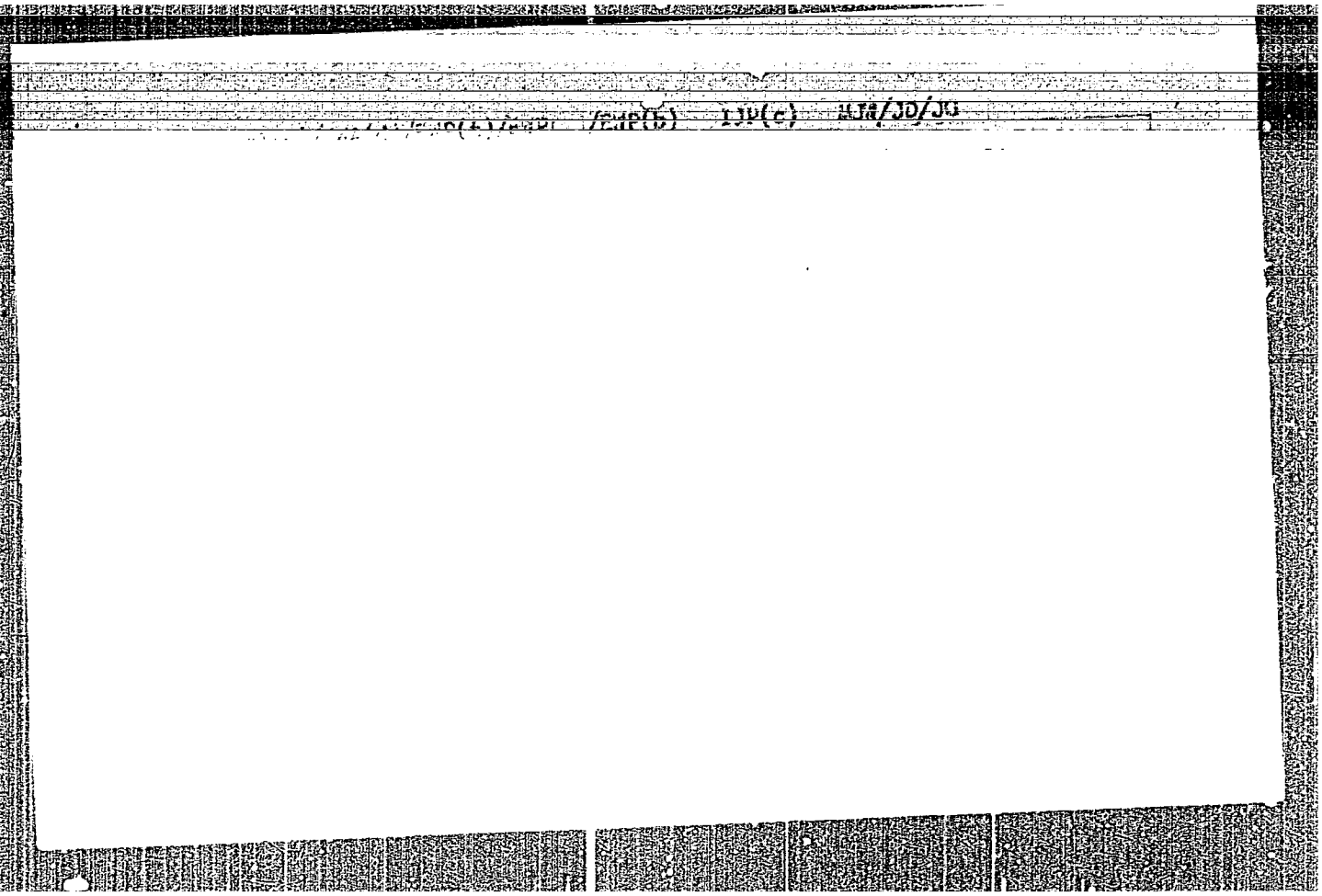
Kinetics of copper electrodeposition from thiosulfate solutions of monovalent copper at high current densities. Ukr. khim. zhur. 31 no.6:584-587 '65. (MIRA 18:7)

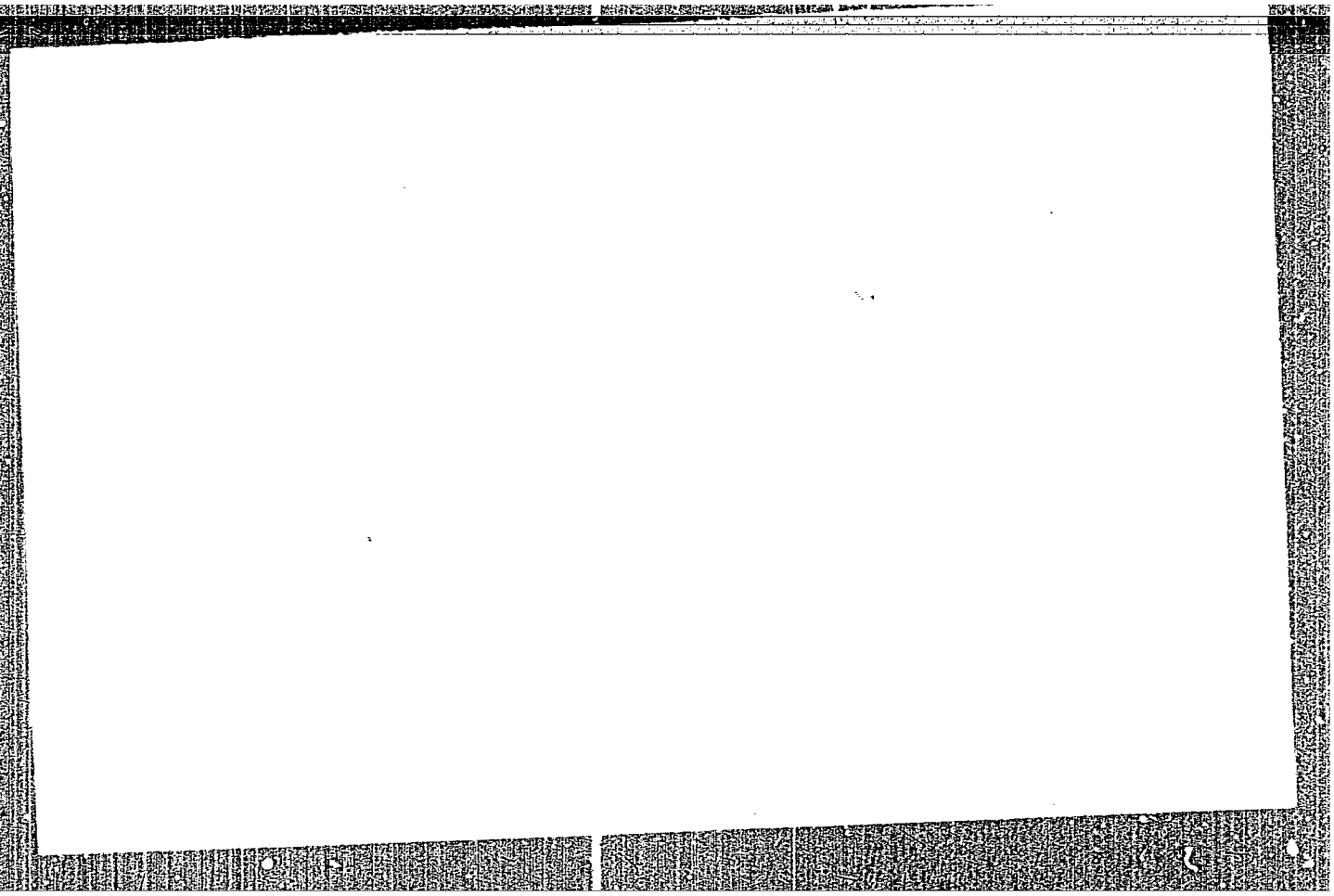
1. Dnepropetrovskiy gosudarstvennyy universitet.

YEMEL'YANENKO, G.A.; AFANASENKO, V.I.

Temperature dependence of the rate of chromium electrodeposition at constant polarization of the cathode. Zhur. fiz. khim. 39 no.3:631-633 Mr '65. (MIRA 18:7)

1. Dnepropetrovskiy gosudarstvennyy universitet.





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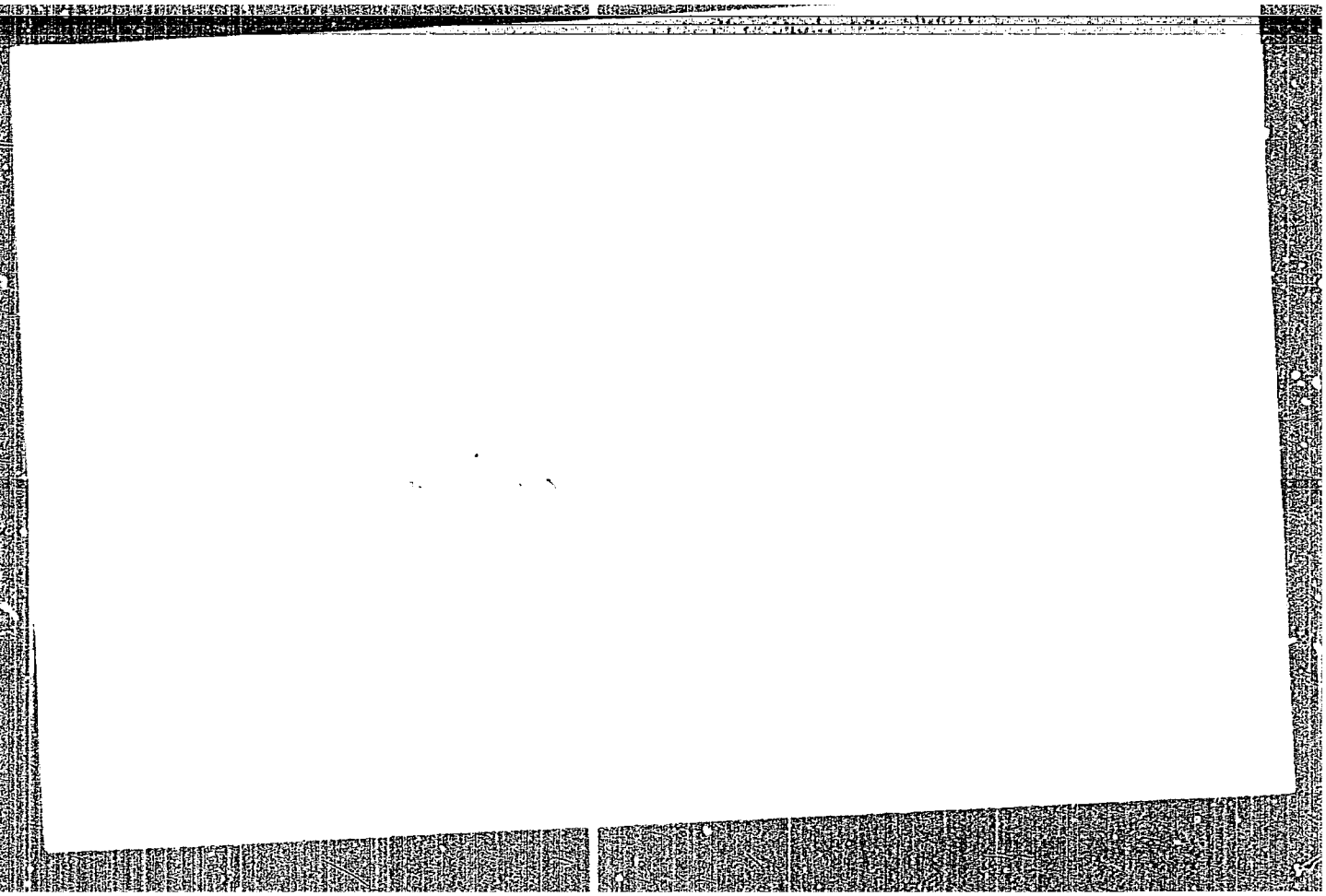

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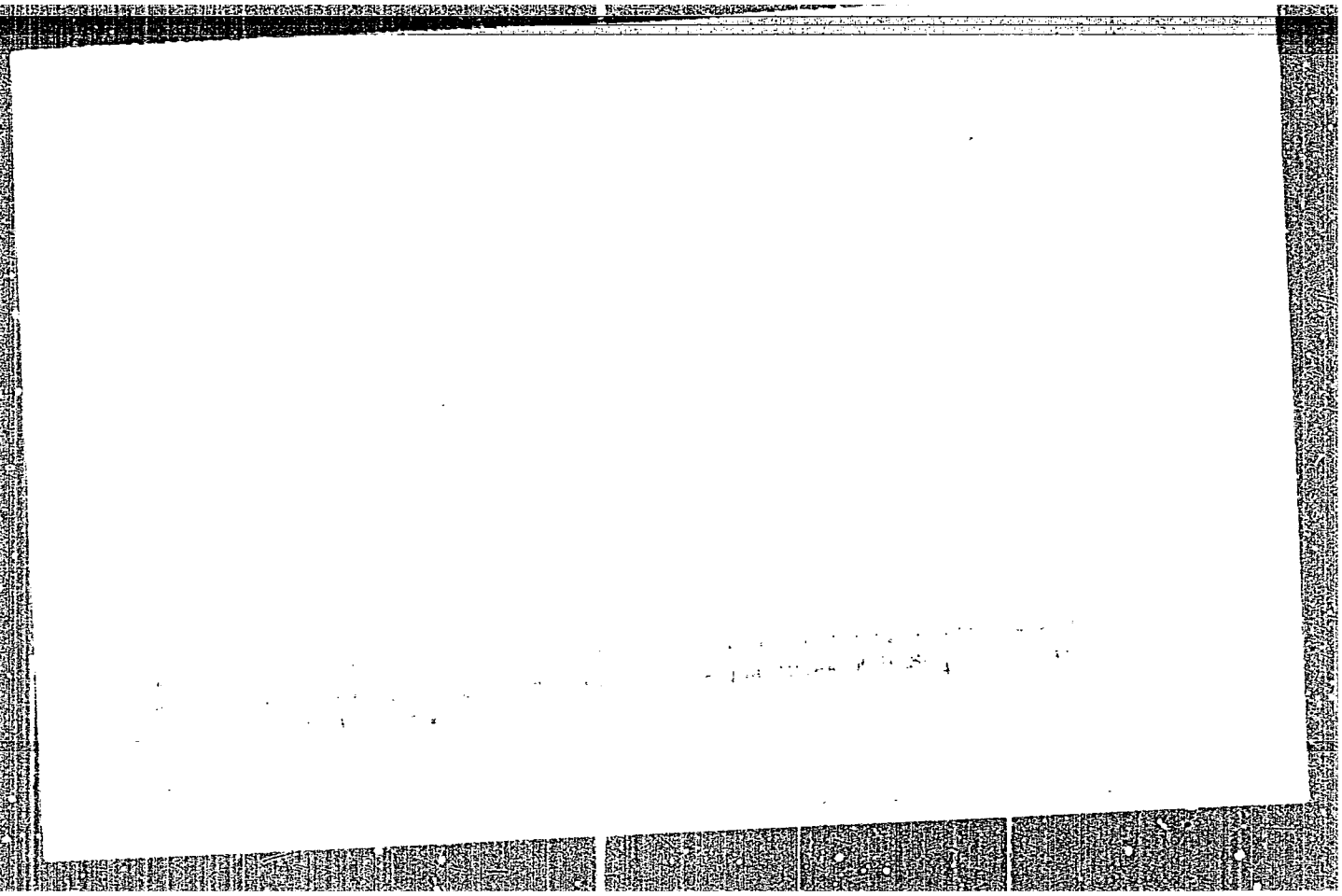

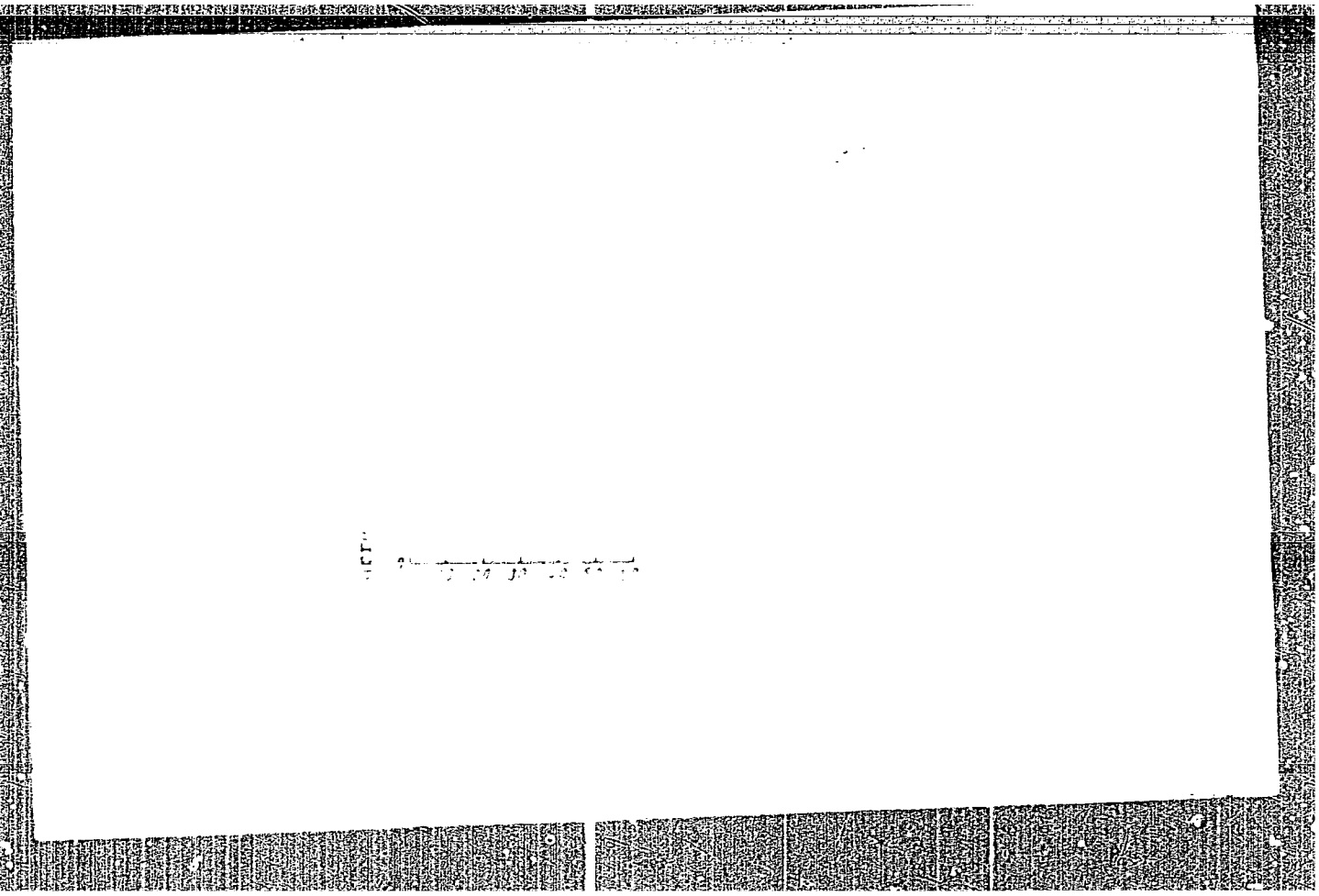

YEMEL'YANENKO, G.A.; SIMULIN, G.G.

Electrodeposition kinetics of cobalt at high current densities. Zhur. fiz. khim. 39 no.5:1077-1081 My '65. (MIRA 18:8)

1. Dnepropetrovskiy gosudarstvennyy universitet.

YEMEL'YANENKO, G.A.; SIMULIN, G.G.

Determination of the transition time for electrode processes. Zhur. fiz.khim. 39 no.7:1739-1741 Jl '65. (MIRA 18:8)

1. Dnepropetrovskiy gosudarstvennyy universitet.

YEMEL'YANENKO, G.A.; AFANASENKO, V.I.

Effect of the temperature on the electrodeposition of chromium. Zhur. fiz. khim. 39 no.4:850-854 Ap '65. (MIRA 19:1)

1. Dnepropetrovskiy gosudarstvennyy universitet. Submitted July 1, 1963.

YEMEL'YANENKO, G.A.; SIMULIN, G.G.

Electrodeposition of copper from thiosulfate solutions of cuprous oxide. Ukr.khim.zhur. 31 no.5:478-480 '65. (MIRA 18:12)

1. Dnepropetrovskiy gosudarstvennyy universitet. Submitted Sept. 25, 1963.

S/080/62/035/009/008/014
D204/D307

AUTHORS: Yemel'yanenko, G.A., Baybarova, Ye.Ya., and Semeryuk, V.I.

TITLE: The electrodeposition of cadmium in the presence of hide glue (A), gelatine (B), and sulphonated naphthalene (C)

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 9, 1962, 2007 - 2011

TEXT: The effects of A, B, and C on the electrodeposition of Cd from a solution containing 50 g $CdSO_4 \cdot 8/3\ H_2O$ and 50 g H_2SO_4 per liter were studied at room temperature, in an effort to improve the properties of electrolytic cadmium used as anticorrosive coatings on Fe. The cathodic polarization, $\Delta\varphi$, was measured at various current densities, with and without additives, using a 1 cm^2 flat cathode and a large Cd anode. The greatest increases in $\Delta\varphi$ ($\gtrsim$ 100 mv) were observed with simultaneous additions of A and C or B and C. $\Delta\varphi$ increased with i (0.4 - 2.0 a/dm^2) and passed through maxima

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The electrodeposition of cadmium ...

with increasing concentration of the additives; e.g. with 1 g A/liter $\Delta\varphi$ was maximum at ~5 g C/l, whilst with 10 g A/l the polarization was greatest when 2 - 5 g of C were added. These effects are ascribed to the formation of strong adsorption layers of the additives on the surface of Cd; the layers were stronger when C was added to a solution containing 10 g/l of A or B, than when C was added to those containing only 1 g/l of either A or B. The eventual lowering of $\Delta\varphi$ at high concentrations of C is explained by a relative excess of this additive in the adsorbed layer, over A or B. The adsorbed layers increased the energy barrier for the discharge and dehydration of Cd ions and facilitated the production of dense, fine-grain deposits of the metal. There are 3 figures and 2 tables.

SUBMITTED: June 5, 1961

Card 2/2

YEMEL'YANENKO, G.O. [IEmel'ianenko, H.H.], kand.filos.nauk, dots.

A great book about the truth of life. Nauka i zhyttia 9 no.4:6-9 Ap '59. (MIRA 12:7)

(Lenin, Vladimir Il'ich, 1870-1924)
(Dialectical materialism)

YEMEL'YANENKO, I., prepodavatel'

Practice in related jobs is a valuable training method. Prof.-tekh.obr. 15 no.9:16 S '58. (MIRA 11:11)

1. Lyublinskiy industrial'nyy tekhnikum.
(Lyublino--Technical education)

YEMEL'YANENKO, G.G. [IEmel'ianenko, H.H.], kand.filos.nauk, dots.

The founder of scientific communism. Nauka i zhyttia 8 no.5: 1-5 My '58. (MIRA 13:4)
(Marx, Karl, 1818-1883)

YEMEL'YANENKO, I., prepodavatel' psikhologii i pedagogiki

Let's improve pedagogical training. Prof.-tekh. obr. 20 no.3:19 Mr '63. (MIRA 16:3)

1. Lyublinskiy industrial'nyy tekhnikum.
(Vocational education) (Teachers, Training of)

L 31965-66 EWT(m)/EWP(1)/T IJP(c) WW/RM

ACC NR: AR6016566 SOURCE CODE: UR/0196/65/000/012/V034/V034

AUTHOR: Yemel'yanenko, L. D.; Tsvetkov, V. N.

TITLE: Investigation of properties of translucent and light-diffusing glass-reinforced plastics

SOURCE: Ref. zh. Elektrotekhnika i energetika, Abs. 12V214

REF SOURCE: Sb. Fizika Dokl. k XXIII Nauchn. konferentsii Leningr. inzh.-stroit. in-ta. L., 1965, 89-90

TOPIC TAGS: light diffusion coefficient, reinforced plastic, glass reinforced plastic, translucence coefficient, colored glass reinforced plastic

ABSTRACT: The measurement results are given of the translucence and light-diffusion coefficients of 10 types of achromatic and colored glass reinforced plastics manufactured in the USSR to justify their use as transparent structural parts in building construction. The orig. art. has: 1 table. G. L'vina. [Translation of abstract] [AH]

SUB CODE: 11/ SUBM DATE: 00

Card 1/1 LC

L 47215-66 EWP(e)/EWT(m)/EWP(j)/T IJP(c) WW/RM/WH

ACC NR: AR6017568 SOURCE CODE: UR/0196/66/000/001/B014/B014

33

AUTHOR: Yemel'yanenko, L. D.; Obarin, L. A.; Tsvetkov, V. N.

B

REF SOURCE: Sb. Fizika. Dokl. k XXIII Nauchn. konferentsii Leningr. inzh.-stroit. in-ta. L., 1965, 83-86

TITLE: Investigation of certain physical properties of domestic fiber glass

15

SOURCE: Ref. zh. Elektrotekhnika i energetika, Abs. 1B82

TOPIC TAGS: fiber glass, temperature coefficient

TRANSLATION: Thermal, optical and acoustical properties of flat and corrugated polyester fiber glass based on PN-1 resin and ZhS-04 glass fibers are analyzed. The coefficients of heat transfer (λ) and temperature conductivity (a) for two batches of specimens (30 x 30 cm) were calculated using the V. S. Volkenshteyn method. The average values for the first batch were $a=7.4\cdot10^{-8}$ m^2/sec; $\lambda=0.77$ w/m·deg, and for the second batch $a=6.8\cdot10^{-8}$ m^2/sec; $\lambda=0.2$ w/m·deg. 1 figure, 2 references. V. Kostyukov.

SUB CODE: 11/ ~~SUBM DATE: none~~ UDC: 621.315.619

Card 1/1 fv

ACC NR: AR6031873 SOURCE CODE: UR/0058/66/000/006/D093/D093

AUTHOR: Yemel'yanenko, L. D.

TITLE: Methods of evaluating the optical properties of polyester glass reinforced plastics /15

SOURCE: Ref. zh. Fizika, Abs. 6D755

REF SOURCE: Sb. Issled. po matem. i eksperim. fiz. i mekhan. L., 1965, 164-171

TOPIC TAGS: optics, optical property, polyester, glass reinforced plastic

ABSTRACT: The coefficient of directional light transmission /15 and the coefficient of reflection and diffuse reflection were measured for samples of industrial glass reinforced plastics. A study was made of the effect of temperature, moisture and ultraviolet radiation on the optical properties. It was shown that glass reinforced plastic is a dispersive medium with a high degree of nonuniformity to which it is difficult to apply the existing analytical relationships. E. Glazunov. [Translation of abstract]

SUB CODE: 20/

Card 1/1

YEMEL'YANENKO, L.P.

p.3

PHASE I BOOK EXPLOITATION SOV/5544

Tomashov, N. D., Doctor of Chemical Sciences, Professor, ed.

Korroziya i zashchita konstruktsionnykh metallicheskikh materialov; sbornik statey (Corrosion and Protection of Constructional Metals; Collection of Articles) Moscow, Mashgiz, 1961. 258 p. Errata slip inserted. 10,000 copies printed.

Ed. of Publishing House: N.P. Yevstaf'yeva; Tech. Ed.: G.V. Smirnova; Managing Ed. for Literature on Chemical and Textile Machine Building: V.I. Rybakova, Engineer.

PURPOSE: This collection of articles is intended for scientific and technical personnel concerned with the corrosion and protection of metals.

COVERAGE: The collection deals with problems of the corrosion of constructional metals in various environments and conditions. Articles discuss new methods for the investigation and testing of corrosion and give results of recent research conducted on the corrosion and protection of metal constructions. The corrosion of some new alloys is also considered. The collection includes

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articles generalizing the results of research conducted during the last 2-3 years in the Department for Corrosion of Metals of the Moskovskiy institut stali (Moscow Steel Institute). Some of the articles were written in cooperation with the laboratory staffs of the "Serp i molot" Plant and Khimicheskiy zavod im. M.I. Kalinina (Chemical Plant imeni M.I.Kalinin) and are based on investigations conducted at these plants. No personalities are mentioned. There are 219 references, Soviet and non-Soviet. References accompany each article.

TABLE OF CONTENTS:

Corrosion and Protection (Cont.)

PICKLING OF SOME METALS AND ALLOYS

Corrosion and Protection (Cont.)

CORROSION AND PROTECTION OF SOME METALS AND ALLOYS IN ACIDS AT ELEVATED TEMPERATURES

CORROSION ENDURANCE OF STEEL

CORROSION AND PROTECTION IN CERTAIN BRANCHES OF THE CHEMICAL INDUSTRY

Titov, V. A., L. A. Markovich [Engineer], and A. V. Prosvirin. Investigating the Corrosion Resistance of Certain Metals and Alloys in Hexachloran Production 254

AVAILABLE: Library of Congress (TA462.T64)

VK/wrc/mas
10-5-61

S/137/61/000/011/098/123
A060/A101

AUTHORS: Zhuk, N. P., Yemel'yanenko, L. P.

TITLE: Influence of carbon content upon the gas corrosion of carbon steels in air

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 11, 1961, 43, abstract 11I291 (V sb. "Korroziya i zashchita konstrukts. metallich. materialov", Moscow, Mashgiz, 1961, 40-52)

TEXT: A study was made of the influence of the carbon content (0.06 - 1.34 %) upon the gas corrosion of carbon steels from experimental heats in air at 500 - 1,100°C. The method was used of periodically weighing the specimens without extraction from the reaction zone of the furnace, the determination of the weight losses of the specimens after oxidation and scale removal, measuring the microhardness and studying metallographically the transverse sections of the specimens after oxidation. The scale growth on all steels at all the temperatures investigated proceeds according to the parabolic law $\Delta g^n = k\tau$, whose exponent n varies between rather wide limits (from 4 to 1.5) as function of the testing temperature. The law of variation of n as a function of the temperature for every steel is

Card 1/2

S/137/61/000/011/098/123
A060/A101

Influence of carbon content ...

violated, as a rule, in the region of temperatures corresponding to changes occurring in the steel and in the adjacent scale layer: the formation of wustite in the scale, eutectoid, magnetic and allotropic transformations in the steel, strong dissociation of the oxide $\alpha - Fe_2O_3$. The temperature dependence of the oxidation rate K of steel in air has the shape of a broken straight line in the coordinates log K versus 1/T, and the breaks in the straight line, accompanied by corresponding changes in the activation-energy Q of the activation process, take place in the region of temperatures corresponding to the abovementioned transformations: the appearance of wustite in the scale is accompanied by a rise of Q, eutectoid and magnetic transformations cause a rise of Q, an allotropic transformation causes a drop of Q. The depth of the apparent and the real decarbonization of carbon steels increases as the temperature rises, and decreases with an increase of the C content in the steel. The decarbonization process of carbon steels leads to a reduction of their oxidation rate in air. The oxidation rate of steels is lowered as their C content is raised, and this effect becomes more pronounced with increasing temperature.

V. Tarisova

[Abstracter's note: Complete translation]

Card 2/2

S/081/62/000/001/033/067
B151/B101

18.4/0

AUTHORS: Zhuk, N. P., Yemel'yanenko, L. P.

TITLE: The effect of carbon content on the gas corrosion of carbon steels in air

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 1, 1962, 306, abstract 1I183 (Sb. "Korroziya i zashchita konstrukts. metallich. materialov". M., Mashgiz, 1961, 40-52)

TEXT: A study of the effect of the carbon content on the gas corrosion of carbon steels (oxidation and decarbonization) in air is described, using periodic weighing without removing the sample from the furnace, at temperatures from 500 - 1000°C. At high temperatures (850 - 1100°C) the rate of oxidation of carbon steels decreases with increasing C content. At temperatures from 700 - 800°C the oxidation process is complex, showing varying rates of oxidation. In the temperature region 500 - 650°C the C shows an insignificant effect on the rate of oxidation of carbon steels. The scale growth in all the steels, at the temperatures studied, follows

Card 1/2

The effect of carbon ...

the law $\Delta g^n = k\tau$. The rate of oxidation of the steels decreases with increasing C content. This effect increases with increasing temperature. [Abstracter's note: Complete translation.]

Card 2/2

22032

S/177/61/000/001/008/010
D211/D306

27.6330

AUTHORS: Oksengendler, G.I., Captain of Medical Services, Aralov, S.S., Senior Engineer-Lieutenant, and Yemel'yanenko, M.I., Major of Medical Services

TITLE: An apparatus for studying the stability of attentiveness

PERIODICAL: Voyenno-meditsinskiy zhurnal, no. 1, 1961, 74 - 76

TEXT: The proposed apparatus permits the automatic recording of the above-mentioned test. It consists of a panel with nos. 1 - 25 not given in sequence. Under each number there is an electric contact; the airman undergoing the test touches the contact with a connecting rod and closes the circuit; only when he touches the correct consecutive number are the results registered on a tape recorder and the graphs obtained show the times needed to find individual numbers as well as the total time taken during the test. A schema-

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22032
S/177/61/000/001/008/010
D211/D306

An apparatus for studying ...

tic diagram of the apparatus is given. The automatic tape recorder requires an alternating current of 220 volts and the stepfinder a direct current of 24V. In the author's opinion this apparatus may be used for studying the psycho-physiological characteristics of flying personnel. There are 3 figures.

SUBMITTED: April, 1960

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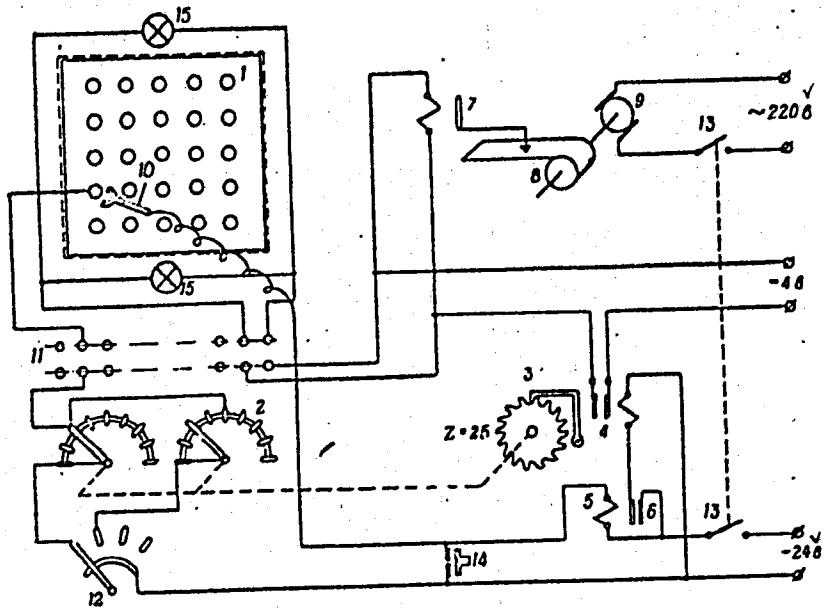
22032
S/177/61/000/001/008/010
D211/D306

An apparatus for studying ...

Fig. 2.



Card 3/4

An apparatus for studying ...

Fig. 2. (cont'd)

Legend: 1 - Numbered panel; 2 - stepfinder ATS (Dial Telephone System); 3 - relay of the stepfinder; 4 - contacts of the signal system; 5 - 6 - lamps; 7 - recorder; 8 - recording tape moving at a constant speed of 15 cm/min; 9 - Warren's electric motor; 10 - contact rod; 11 - device for exchanging number panels; 12 - key for changing no. sequences; 13 - switches to the general current supply; 14 - button which puts the stepfinder into a new working position; 15 - signal lamps.

Card 4/4

YEMEL'YANENKO, M. I. Major of the Medical Service,--A Simple Method of Determining Permeability of the Blood Vessel Wall. OKSENGENDLER, G.I.

Voyenno-Meditsinskiy Ahurnal, No. 11, 1961, pp. 76-79.

YEMEL'YANENKO, M.I., mayor meditsinskoy sluzhby; OKSENGENDLER, G.I., kapitan meditsinskoy sluzhby

Simple method for determining the permeability of the vascular wall. Voen.-med. zhur. no.11:79 N '61. (MIRA 15:6)
(BLOOD VESSELS--PERMEABILITY)

YEMEL'YANENKO, M. T.

Stellar Astronomy, Kinematics and Dynamcis of Stellar Systems (1743)
Peremennyye Zvezdy, Vol 9, No 4, 1953, pp 266-270
YEMEL'YANENKO, M. T. and MATVEYEV, I. V.
"An Investigation of Irregular and Semiregular Variables" Part III; "Several Properties of the Visual Distribution of Irregular and Semiregular Variables"
As a result of their studies, the authors succeeded in dividing 75% of the stars they examined into 28 groups, which occupy 4.6% of the area of the celestial sphere. The article contains a map and list of these groups.

SO: Referativnyy Zhurnal--Astronomiya i Geodeziya, No 1, Jan 54;(W-30785, 28 July 1954.)

CHEREPASHCHUK, A.; YEMEL'YANENKO, M.T., nauchnyy rukovoditel'

Photometric observations of the total lunar eclipse on May 13-14, 1957. Uch.zap.Kuib.gos.ped.inst. no.37:10-16 '62. (MIRA 16:1)

(Eclipses, Lunar)

CHEREPANOVA, Ye.P., YEMEL'YANENKO, N.I., NESTERKO, A.D.

Ampalykskoye iron ore deposit. Sov. geol. 3 no.7:122-123 Jl '60. (MIRA 13:8)

1. Ampalykskaya geologorazvedochnaya partiya.
(Kuznetsk Basin--Iron ores)

S/135/61/000/004/010/012
A006/A101

AUTHORS: Andrianov, K. I., Supereko, O. D., Nikolayeva, L. I., Kudryavtsev, K. V. Yemel'yanenko, N. L., Engineers

TITLE: Ceramic Nozzles of the A-547r Semi-Automatic Machine for Welding in Carbon Dioxide

PERIODICAL: Svarochnoye proizvodstvo, 1961, No. 4, pp. 37 - 38

TEXT: Welding in carbon dioxide with consumable electrode is used at the Chelyabinsk Tractor Plant for joining tractor parts on the A-547r semi-automatic machine, where the gas flow is directed by a chromeplated brass nozzle (Fig. 1), placed on the rubber housing of the burner tip. The use of this nozzle presents however, a series of deficiencies, such as short-circuits of the welding current; sticking of metal splashings to the internal nozzle surface, and short service life of the nozzle. The laboratory of mineral ceramics at the Plant developed ceramic nozzles to replace the chrome-plated brass nozzles, prepared in a metallic mold by press-forming from a ceramic mass of 12 - 14% moisture. The components of the ceramic material were dried, crushed, screened, and mixed during 8 h. The material was then wetted with water to 28 - 30% for

Ceramic Nozzles of the A-547r Semi-Automatic Machine for Welding in Carbon Dioxide

seven days and then molded. The molded nozzles were dried at room temperature and roasted in an electric furnace. Ceramic nozzles of the following compositions were manufactured by the described technology:

Designation of materials	Composition in % of the mass				
	I	II	III	IV	V
Talcum chlorite	80	70	60	-	-
Refractory clay	20	30	40	15	20
Quartz	-	-	-	20	15
Fluorspar	-	--	-	30	25
Porcelain waste	-	-	-	10	35
Kaolin	-	-	-	25	5

S/135/61/000/004/010/012
A006/A101

Ceramic Nozzles of the A-547r Semi-Automatic Machine for Welding in Carbon Dioxide

Talcum-chlorite containing nozzles were roasted according to graph 3. Tests performed with experimental ceramic nozzles proved satisfactory. The replacing of brass nozzles by the new ceramic ones presents the following advantages: the possibility of a contact between the nozzle and the part to be welded is excluded the durability of nozzles is raised by a factor of 14 - 16; scare chrome-plated brass is replaced by cheap ceramic material; labor consuming processes of manufacturing the nozzles are substituted by advanced press forming methods, eliminating subsequent mechanical treatment; the time of exchanging and cleaning the nozzles from metal splashings is considerably reduced. There are 1 table and 4 figures.

ASSOCIATION: Chelyabinskiy traktornyy zavod (Chelyabinsk Tractor Plant)

Card 3/3

ANDRIANOV, K.I., inzh.; SUPEREKO, O.D., inzh.; NIKOLAYEVA, L.I., inzh.; KUDRYAVTSEV, K.V., inzh.; YEMEL'YANENKO, N.L., inzh.

Ceramic nozzles for A-547 r semiautomatic machines for weling in an atmosphere of carbon dioxide. Svar. proizv. no.4:37-38 Ap '61. (MIRA 14:3)

1. Chelyabinskiy traktornyy zavod.
(Electric welding—Equipment and supplies)
(Protective atmospheres)

38363
S/058/62/000/005/090/119
A061/A101

14,7200

AUTHORS: Moldovanova, M., Yemelyanenko, O.

TITLE: Comprehensive investigation of carrier equilibrium in InSb and GaAs

PERIODICAL: Referativnyy zhurnal, Fizika, no. 5, 1962, 33, abstract 5E259 ("Godishnik Sofiysk. un-t. Fiz.-matem. fak.," 1959-1960 (1961), v. 54, no. 2, 1-9, Bulgarian; English summary)

TEXT: A comprehensive investigation has been conducted on conductivity, the Hall coefficient, the coefficient of the transverse thermomagnetic effect, and the thermoemf on the same p-type InSb and GaAs specimens at temperatures between 86 and 424°K for InSb, and between 86 and 550°K for GaAs. The hole concentration for InSb was $4.3 \cdot 10^{15}$ cm^{-3}. The impurities were completely ionized in the temperature ranges investigated. The entrainment of carriers by phonons was observed below 110°K. Above this temperature, the carrier mobility in the impurity zone obeyed the law $u_p \sim T^{-1.5}$, and in the zone of intrinsic conductivity it obeyed the law $u_n \sim T^{-1.4}$. Above room temperature, the electron gas became partly degenerate. The consideration of degeneracy led to the values of the effective masses: $m_p = 0.174\ m_o$, $m_n = 0.045\ m_o$; in the opposite case:

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S/058/62/000/005/090/119
A061/A101

Comprehensive investigation of carrier equilibrium...

$m_p = 0.167\ m_o$, $m_n = 0.043\ m_o$. $b = 30$ was found for the ratio of carrier mobilities. For GaAs, the hole concentration at temperatures above 77°K was $4.5 \cdot 10^{18}$ cm^{-3}. The electron gas started becoming degenerate at 250°K. The carriers were scattered partly by the impurity, and partly by the lattice (the latter scattering prevailed at high temperatures). The effective mass was $m_p \approx 0.5\ m_o$.

I. Menbayeva

[Abstracter's note: Complete translation]

Card 2/2

S/194/62/000/007/075/160
D295/D308

AUTHORS: Moldovanova, M., and Yemelyanenko, O.

TITLE: Complex investigations of InSb and GaAs at equilibrium carrier concentration

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 7, 1962, abstract 7-4-27 sh (Godishnik Sofiysk. un-t. Fiz.-matem. fak., v. 54, no. 2, 1959-1960 (1961) 1-9 [Bul.; summary in Eng.])

TEXT: Complex investigations of R, σ, α and Q in p-type monocrystals of InSb and GaAs have been carried out in temperature ranges of 86 - 424°K for InSb and 86-576°K for GaAs. It has been shown that the Hall coefficient and carrier concentration in p-type InSb in the 86-134°K range are constant and equal to 1700 cm^3/coulomb and 4.3×10^{15} cm^{-3} respectively. It was found that carrier mobility follows the law $U_p \simeq T^{-1.5}$ in the impurity region and the law $U_p \simeq T^{-1.4}$ in the intrinsic conductivity region. At 324°K the p-carrier mobility was 1700 cm^2/V sec. and the n-carrier mobility to

Card 1/2

Complex investigations of InSb ...

5.1×10^4 cm^2/V sec. The width of the forbidden band at absolute zero, ΔE_o, was found to be equal to 0.268 eV. The effective mass of the p and n-carriers corresponded to 0.174 and 0.45 m_o (allowing for the fact that the electron gas above room temperature is partially degenerate). In p-type GaAs, in the impurity region 86-200°K the carrier concentration was equal to 4.5×10^{18} cm^{-3}, and the effective mass was $m_p \simeq 0.5\ m_o$. 16 references. [Abstracter's note: Complete translation.]

Card 2/2

AUTHORS: Yemel'yanenko, O. V., Nasledov, D. N. 57-28-6-8/34

TITLE: The Electrical Properties of GaAs at Low Temperatures (Elektricheskiye svoystva GaAs pri nizkikh temperaturakh)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 6, pp. 1177-1187 (USSR)

ABSTRACT: Gallium arsenide is a semiconductor compound of the type $A^{III}B^{V}$. The electrical properties of $A^{III}B^{V}$ are similar to those of germanium and silicon and are, in most cases, explained by means of the theory of atomic semiconductors. The characteristic feature of numerous compounds of the type $A^{III}B^{V}$ is the small effective mass of the conduction electrons m_n^+. Thus for InSb $m_n^+ = 0{,}013$ m and for InAs $m_n^+ = 0{,}064$ m (m - mass of free electrons). In the present paper full independence of conductivity and of the Hall constant (Kholl) of temperature in the interval 1,5 — 300°K was obtained for the n-samples of GaAs. Analogous results have formerly been obtained for the n-samples of InSb and

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InAs. Analysis of these data showed that the semiconductors mentioned are in the metal state at the respective concentrations of the donor impurities ($N_d \approx 10^{17} \div 10^{18}$ cm^{-3}). The activation energy of the impurities in their case is equal to zero. The concentration of current carriers is steady. The carrier gas is highly degenerated. An important part is played in connection with the metallization of these materials by the small effective mass of the electrons. The non-dependence of carrier mobility upon temperature is explained qualitatively by the function of those processes of dispersion the effective cross section of which does not immediately depend upon temperature. In the analysis of results the term "temperature of semi-ionization of admixtures was introduced. This term is of general validity for semiconductors with high concentrations of admixtures, and with its help it is possible to determine especially the fact of the metallization of the semiconductor ($\Delta E_{pr.} = 0$) after measuring R at not too low temperatures (e. g. temperature of liquid nitrogen). More detailed information

concerning the structure of the energy spectrum in metallized semiconductors and the kinetics of conductivity must be obtained by measurements of the thermoelectromotive force, as well as of R and σ within a larger concentration- and temperature interval. It may also be hoped that this will also explain the nature of the reduction of the resistance of n-samples of GaAs in the magnetic field, which was discovered in the course of this work. The authors thank G. I. Averkiyeva, V. S. Grigor'yeva, T. S. Sukhanova and N. M. Reynov for their cooperation. There are 6 figures, 3 tables, and 14 references, 3 of which are Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut, AN SSSR (Leningrad Physical-Technical Institute, AS USSR)

SUBMITTED: October 1, 1957

Card 3/3

1. Gallium arsenides—Electrical properties 2. Gallium arsenides—Temperature factors 3. Semiconductors—Analysis 4. Semiconductors—Magnetic factors

AUTHORS: Averkiyeva, G. K., Yemel'yanenko, O. V. SOV/57-28-9-13/33

TITLE: Effect of Impurities on the Electric Properties of Gallium Arsenide (Vliyaniye primesey na elektricheskiye svoystva arsenida galliya)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1958, Vol 28, Nr 9, pp. 1945-1947 (USSR)

ABSTRACT: The present article presents information on experiments in which a number of elements of the columns I - VI were introduced into a compound of the type $A^{III}B^{V}$, that is to say into gallium arsenide. Such a study may be expected to yield evidence bearing on the effects of elements of various groups upon the electric properties of GaAs and upon the most effective donor and acceptor admixtures. The samples were produced by an immediate joint melting of the components in evacuated tightly soldered quartz ampoules. The evidence obtained leads to the following statements: 1) The elements of the II column, Zn and Cd act in GaAs as acceptors, those of the VI column, S, Se and Te as donors just as they do in other $A^{III}B^{V}$ compounds. 2) Copper is an acceptor, this result complying with that found by Shmirous (Shmirous) (ref 1) for GaSb. 3) The elements of the III.- V.column, In, Si, Ge, Sn,

Card 1/4

Effect[illegible] of Impurities on the Electric Properties of Gallium Arsenide

Sb do not form active centers in GaAs. 4) The mobility of electrons and of holes is only little dependent upon the type of impurity and upon the concentration of the admixtures. No influence of the impurities upon the strength of GaAs could as yet be found, as only in a few cases it was possible to measure the microstrength of the excess phases. Samples with Ge impurities exhibited a strength coinciding with that of pure germanium. Indium produces an excess phase which exhibits a whole spectrum of microstrength values, which could be identified with such of the solid $Ga_xIn_{1-x}As$ solutions.

The elements of the II. column, zinc in particular, are better soluble in gallium arsenide than the elements of the VI. column. Zinc proved to be the most effective acceptor admixture and selenium as the most effective donor admixture. The crystals formed by samples with Zn- and Se admixtures had the same dimensions as those without admixtures. When the acceptor elements Cu and Cd were introduced into a n-type material a high mutual compensation of acceptors and donors was found. This occurred more frequently than [illegible] could be ex-

SOV/ -2 -

Effect of Impurities on the Electric Properties of GaAs

pected from the premise that the donor and the acceptor impurities dissolve independently in GaAs. There is reason to believe that the dissolving of the acceptor impurities is considerably facilitated by the existence of non-compensated donor centers. D. N. Nasledov and N. A. Goryunov discussed the work with the authors. A. D. Kurov assisted in the preparation of the samples and in the preparation and the study of the polished sections. There are 1 table and 7 references, 1 of which is Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR (Leningrad Physical and Technical Institute, AS USSR)

SUBMITTED: April 10, 1959

Card 3/4

YEMEL'YANENKO, O.V.; NASLEDOV, D.N.

Hernst-Ettingshausen effect in gallium arsenide. Fiz. tver. tela 1 no.6:985-988 Je '59. (MIRA 12:10)

1. Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Gallium arsenide--Electric properties)

69086
S/120/60/00/01/027/051
E192/E382

24.7600
AUTHORS: Yemel'yanenko, O.V. and Trishin, N.V.

TITLE: An Instrument for the Investigation of the Kinetic Effects in Semiconductors

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, Nr 1, pp 98 - 99 (USSR)

ABSTRACT: The device described is a laboratory instrument suitable for the measurement of the electrical conductivity, the Hall effect, Nernst-Ettingshausen effect and the thermal emf's in semiconductor samples at temperatures ranging from 80 - 900 °K. The diagram of the instrument is shown in the figure on p 99. The investigated sample 5 is placed between two graphite blocks 1 which clamp the sample due to the tension of the spring 4 . The blocks are furnished with side grooves 2 and centre holes. Porcelain tubes are placed in these holes in order to accommodate the thermocouples 6 . The probes for the measurement of the electrical conductivity and the Hall and Nernst-Ettingshausen effects are made of tungsten wire, having a diameter of 0.1 mm and are situated in the grooves of the upper block. The probe and

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the thermocouple wires are insulated by means of quartz capillary tubes 11. The upper block is fixed to a glass stem by means of a fine steel tube 8 . The glass stem contains all the output wires. Before the measurements, the device is evacuated and then filled with an inert gas. The blocks and the sample are heated or cooled externally. For this purpose, the instrument is inserted into a two-section tubular oven. Each section (A and B) heats one of the blocks. If it is necessary to carry the measurements at low temperatures, the instrument, together with the oven, is placed into the stream of evaporating nitrogen. The outer diameter of the device is 12.5 mm, the diameter of the blocks being 10 mm. The investigated samples can have dimensions ranging from $1 \times 2.5 \times 6$ mm^3 to $4 \times 6 \times 30$ mm^3. The instrument reaches a thermal equilibrium in about 20 to 30 min. The samples can easily be removed by taking out the lower block. The measurements are carried out as follows. The "heater" and

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the "refrigerator" of the device produce a temperature difference along the sample. This is determined by the thermocouples. The thermal emf can also be determined by means of the thermocouples. In order to determine the Hall effect, the instrument should be placed in a magnetic field. The authors thank D.N. Nasledov for his interest in this work. There are 1 figure and 3 Soviet references.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR (Physics-engineering Institute of the Ac.Sc., USSR)

SUBMITTED: January 2, 1959

YEMEL'YANENKO, O.V.; LAGUNOVA, T.S.; NASLEDOV, D.N.

Scattering of current carriers in strongly degenerated gallium arsenide. Fiz. tver. tela 2 no.2:192-197 F '60. (MIRA 14:8)

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(Gallium arsenide)

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AUTHORS: Yemel'yanenko, O. V., Kesamanly, F. P.

TITLE: The Problem of Methodology of Quick Precision Measurement of the Thermo-emf of Semiconductors

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 7, pp. 1494-1496

TEXT: The authors describe an apparatus with the help of which it is possible to measure the thermo-emf in a short time. The method is based on the application of thermocouples with controlled heating. The two thermocouples are surrounded by a heater which is in the immediate neighborhood of the measuring junction (Fig. 1). One of the junctions of couple I is in contact with the object, while one junction of couple II is separated from it by a small gap. The second couple controls the heating. With this comparison instrument a very exact measurement of temperatures is possible. Applying this method of measuring temperature, the authors constructed a simple apparatus for measuring the differential thermo-emf of semiconductors of arbitrary forms of samples in the

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temperature range 25 ÷ 150°C. The apparatus has a high degree of accuracy and rapidity of measurement. It is shown diagrammatically in Fig. 2. For the purpose of measuring, the sample is placed at the ends of two L-shaped copper blocks, the other ends of these blocks being in containers filled with ice. The sample is heated, and the thermocouple is brought manually to the points between which the thermo-emf is to be measured. The temperatures of these two points are measured. The heating of the thermocouples is recorded by two potentiometers. The thermo-emf of the semiconductor and the thermocouple were measured by a potentiometer of the type ППТВ-1 (PPTV-1) and galvanometer of the type М-21/1 (M-21/1). The temperature is measured with an accuracy of 0.1°C, that is, of about 2-3% between 7-10°C. The junctions of the thermocouple had a diameter of 0.4 - 0.5 mm, and the contact diameters were not larger than 0.02 - 0.03 mm. The method requires 10 - 15 minutes for one measurement. To determine the temperature dependence of the thermo-emf of a sample between 25 - 150°C for 10 - 15 points of measurement, 2 - 3 hours are required. The accuracy of measurement of the thermo-emf is ±(2-3)%. Fig. 3 gives an example of a measurement of the temperature dependence of the thermo-emf

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of gallium arsenide. The authors thank Professor D. N. Nasledov for discussions. There are 2 figures and 3 Soviet references.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR Leningrad (Institute of Physics and Technology of the AS USSR, Leningrad)

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AUTHORS: Yemel'yanenko, O. V., Nasledov, D. N., and Petrov, R. V.

TITLE: The Nernst-Ettingshausen Effect in p-Type Gallium Arsenide

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 10, pp. 2455-2457

TEXT: In an earlier paper (Ref. 1) the authors investigated the Nernst-Ettingshausen effect in n-type gallium arsenide. The coefficient $Q^{\perp}$ of the transverse Nernst-Ettingshausen effect in p-type gallium arsenide is graphically represented as a function of temperature. As it turned out, $Q^{\perp}$ is considerably lower for p-type gallium arsenide than for n-type gallium arsenide. This is due to a lower mobility of the holes as compared to the electrons. At temperatures below room temperature, $Q^{\perp}$ is negative, which may be explained by the scattering of carriers by impurity ions. This explanation agrees with measured results of the Hall-mobility of holes. Above 350 to 450°K, $Q^{\perp}$ becomes positive. This convinces the authors of the fact that at these temperatures the acoustic vibrations are the main scattering centers. The mixed conductance

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beginning at 600 - 800°K again makes $Q^{\perp}$ negative. Finally it is pointed out that the results obtained here may be explained by the modern theory of thermomagnetic effects. Furthermore, the results obtained make it possible to estimate the part played by acoustic vibrations of the lattice in scattering processes. There are 1 figure, 1 table, and 3 references: 2 Soviet and 1 US.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR Leningrad (Institute of Physics and Technology of the AS USSR, Leningrad)

SUBMITTED: April 4, 1960

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